

"Fundamental Deficiencies of American Patent Law," *The American Economic Review*, Volume 30, September 1940, pp. 475-491.

U.S. CONGRESSIONAL TESTIMONY:

Transportation Subcommittee of the Senate Committee on Commerce, Science and Transportation on predatory pricing in the airline industry, May 5, 1998.

Aviation Subcommittee of the Senate Committee on Commerce, Science, and Transportation on predatory pricing in the airline industry, April 23, 1998.

Subcommittee on Railroads of the House Committee on Transportation and Infrastructure, Public Hearing on Surface Transportation Board Reauthorization: State of the Railroad Industry, April 22, 1998.

Aviation Subcommittee of the House Committee on Public Works and Transportation on international aviation policy, May 9, 1991.

Subcommittee on Aviation of the Senate Committee on Commerce, Science and Transportation on airline concentration at hub airports, September 22, 1988.

Subcommittee on Aviation of the Senate Committee on Commerce, Science and Transportation on airline safety and re-regulation, November 4, 1987.

Subcommittee on Telecommunications and Finance, House Committee on Energy and Commerce, on competition and deregulation of the telecommunications industry, July 15, 1987.

Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary, on competitive issues in the airline industry, March 25, 1987.

Subcommittee on Monopolies and Commercial Law, Committee on the Judiciary, U.S. House of Representatives, on the Administration's proposed amendments to Section 7 of the Clayton Act, February 26, 1986.

Subcommittee on Aviation of the Senate Committee on Commerce, Science and Transportation on Computerized Reservation Systems, March 19, 1985.

Joint Economic Committee, United States Senate, Hearing on the Economic Issues of a Changing Telecommunications Industry, October 3, 1983.

House Subcommittee on Aviation on "Competitive Problems Raised by Computerized Reservation Systems," June 22, 1983.

House Committee on the Judiciary, on H.R. 1878, "The Shipping Act of 1983," May 19, 1983.

House Committee on Public Works and Transportation on "Coal Slurry Pipelines," April 13, 1983.

House Committee on the Judiciary, on H.J. Res. 350, A Plan to Balance the Federal Budget, August 4, 1982.

Senate Committee on the Judiciary, on S. 1215, the Malt Beverage Competition Act, June 21, 1982.

Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, "Development, Operation and Implementation of the United States International Aviation Policy," December 9, 1981.

Joint Economic Committee, U.S. Congress on "Trucking Regulation," November 17, 1981.

Subcommittee on Monopolies and Commercial Law, House Committee on the Judiciary, "Mergers," August 26, 1981.

Senate Committee on Commerce, Science and Transportation, on S. 898, "The Telecommunications Act of 1981," June 11, 1981.

Subcommittee on Telecommunications, Consumer Protection, and Finance, House Committee on Energy and Commerce, "Telecommunications Regulation," May 20, 1981.

Subcommittee on Health, Senate Committee on Finance, on "The Health Incentives Reform Act," March 19, 1980.

House Budget Committee Inflation Task Force, on the "Treatment of Housing Costs in the Consumer Price Index," January 24, 1980.

Senate Committee on Banking, Housing, and Urban Affairs, on "The Chrysler Loan Guarantee Act," November 15, 1979.

Subcommittee on Surface Transportation, House Committee on Public Works and Transportation, on "Trucking Deregulation," October 4, 1979.

Senate Committee on Commerce, Science, and Transportation, on "Trucking Deregulation," June 26, 1979.

Subcommittee on the Legislative Process, House Rules Committee, on "Sunset Legislation," May 23, 1979.

Testimony on food prices and inflation, before:

- a) House Subcommittee on Domestic Marketing, Consumer Relations and Nutrition; and Subcommittee on Department Investigations, Oversight and Research, Committee on Agriculture, April 4, 1979.
- b) Subcommittee on Antitrust and Monopoly, Senate Committee on the Judiciary, April 6, 1979.

Testimony on hospital cost containment legislation, before:

- a) Subcommittee on Health and the Environment, House Interstate and Foreign Commerce Committee; and Subcommittee on Health, House Ways and Means Committee, March 12, 1979.
- b) Health Subcommittee, Senate Finance Committee, March 13, 1979.

Subcommittee on Environmental Pollution, Senate Committee on Environment and Public Works, on "Environmental Regulation and Inflation," February 27, 1979.

Testimony on authorization and appropriations for the Council on Wage and Price Stability, before:

- a) Subcommittee on Economic Stabilization, House Committee on Banking, Finance and Urban Affairs, February 6, 1979.
- b) Senate Subcommittee on Commerce, Consumer and Monetary Affairs, February 7, 1979.
- c) Senate Committee on Banking, Housing and Urban Affairs, February 9, 1979.
- d) Subcommittee on Treasury, Postal Service, and General Government, House Committee on Appropriations, May 24, 1979.
- e) House Appropriations Committee, February 6, 1980.
- f) Senate Committee on Banking, Housing, and Urban Affairs, March 17, 1980.
- g) Subcommittee on Treasury, Postal Service, and General Government, House Committee on Appropriations, March 31, 1980.
- h) Senate Committee on Banking, Housing and Urban Affairs, April 21, 1980.
- i) Subcommittee on Treasury, Postal Service, and General Government, Senate Committee on Appropriations, April 23, 1980.
- j) Subcommittee on Economic Stabilization, House Banking Committee, May 6, 1980.

House Committee on Ways and Means, on "Real Wage Insurance," January 30, 1979.

Testimony on the President's anti-inflation program, before:

- a) Subcommittee on Economic Stabilization, House Committee on Banking, Currency, and Housing. November 22, 1978.
- b) Subcommittee on Economic Growth and Stabilization, Joint Economic Committee, December 6, 1978.
- c) House Committee on the Budget, January 30, 1979.
- d) Subcommittee on Treasury, Postal Services, and General Government, House Committee on Appropriations, February 14, 1979.
- e) Senate Budget Committee, March 7, 1979.
- f) Subcommittee on Commerce, Consumer and Monetary Affairs, House Committee on Government Operations, June 28, 1979.
- g) Economic Stabilization Subcommittee, House Committee on Banking, Finance and Urban Affairs, October 10, 1979.
- h) Economic Stabilization Subcommittee, Senate Committee on Banking, Housing and Urban Affairs, October 11, 1979.

Subcommittee on Aviation, Senate Commerce, Science, and Transportation Committee, on S. 3363, "The International Air Transportation Competition Act of 1978," August 23, 1978.

National Commission for the Review of Antitrust Laws and Procedures, on "Economic Regulation and Antitrust Exemptions and Immunities," July 26, 1978.

Senate Commerce Committee, on S. 3064, "Airline Noise Legislation," June 14, 1978.

Testimony on CAB appropriations, before:

- a) House Subcommittee on Appropriations, February 28, 1978.
- b) Senate Subcommittee on Appropriations, March 2, 1978.

Testimony on United States international aviation negotiations, before:

- a) Subcommittee on Aviation, House Committee on Public Works and Transportation, September 29, 1977
- b) Aviation Subcommittee, House Public Works and Transportation Committee, on H.R. 11145, March 6, 1978.

House Budget Committee Task Force on Tax Expenditures, Government Organization, and Regulation, on "Airline Regulation," July 14, 1977.

Senate Antitrust and Monopoly Subcommittee, Oversight Hearings on Antitrust Enforcement, on "Enforcement of the Antitrust Laws," May 4, 1977.

Subcommittee on Investigations and Review, House Committee on Public Works and Transportation, on "The Effects of the Clean Water Act on the Electric Utility Industry," April 19, 1977.

Subcommittee on Communications, Senate Committee on Commerce, on "The Communications Act of 1934 Revisited," March 21, 1977.

Subcommittee on Communications, House Committee on Interstate and Foreign Commerce, on "The Consumer Communications Reform Act of 1976," H.R. 12323, September 30, 1976.

Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, on H.R. 12461, the Dingell-Moss Bill, to Prescribe Certain Rules for Federal, State and Local Agencies Regulating Electric Rates, April 7, 1976.

House Subcommittee on Communications, on "Domestic Common Carrier Regulation," November 18, 1975.

Senate Committee on Finance, on H.R. 6860, "The Energy Conservation and Conversion Act of 1975," July 18, 1975.

Subcommittee on Administrative Practice and Procedure, Senate Judiciary Committee, on "Regulation of the Airlines Industry," February 6, 1975.

Senate Committee on Interior and Insular Affairs, on "Financial Problems of the Electric Utility Industry," August 8, 1974.

Joint Economic Committee, U.S. Congress on "Market Power in Relation to Economic Growth," August 1962.

Senate Subcommittee on Patents, on natural rubber cartels, May 23, 1942.

TESTIMONY BEFORE THE FEDERAL POWER COMMISSION, 1958-62

In the matters of:

Area Rate Proceeding (Southern Louisiana Area), Docket Nos. AR61-2, et al.

Area Rate Proceeding (Permian Basin Area), Docket Nos. AR61-1, et al.

Omnibus, Docket Nos. G-9277, et al.

Atlantic Refining Company (Catco), Docket Nos. G-11024, et al.

Sohio Petroleum Company, et al., Docket Nos. G-8488, et al.

Gulf Oil Corporation, Docket Nos. G-9520, et al.

Amerada Petroleum Corporation, et al., Docket Nos. G-9385, et al.

Union Producing Company, Docket Nos. G-18354, et al.

Phillips Petroleum Company, Docket Nos. G-1148, et al.

Tidewater Oil Company, Docket Nos. G-13310, et al.

MISCELLANEOUS TESTIMONY:

Rebuttal Testimony before the Public Service Commission of Maryland, defending a regulated electric distribution company's ability to offer a regulated retail electric generation service and of an unregulated affiliate offering competitive services and the sufficiency of the Maryland Code of Conduct to prevent distortions of competition and cross-subsidization; and defending Baltimore Gas and Electric's proposed shopping credit, on behalf of Baltimore Gas and Electric Company, Case Nos. 8794/8804, March 22, 1999.

"High Capacity Competition in Seattle: Reply to Comments of Intervening Parties," on behalf of U S West (with Timothy J. Tardiff), March 10, 1999.

Testimony before the Public Service Commission of the State of Missouri in the matter of application of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., d/b/a Southwestern Bell Long Distance for Provision of In-Region, InterLATA Services in Missouri, on behalf of Southwestern Bell Telephone Company (with Timothy J. Tardiff), Docket No. TO 99-227, filed November 20, 1998; Surrebuttal Affidavit, February 1, 1999.

Rebuttal Testimony before The Commonwealth of Massachusetts Department of Telecommunications and Energy on public policy considerations and principles re the Boston Edison Company/RCN joint venture (DPU 93-37), on behalf of Boston Edison Company, DTE 97-95, February 12, 1999.

"Comments on Exclusionary Airline Pricing," Submission to the Department of Transportation, September 25, 1998.

"Economic Evaluation of High Capacity Competition in Phoenix," on behalf of U S WEST Communications, requesting that the FCC forebear from regulating it as a dominant carrier in its

sale of high capacity services in the Phoenix metropolitan area (with Timothy J. Tardiff), August 14, 1998 (filed August 19, 1998).

Declaration before the Federal Communications Commission in the matter of Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996 (CC Docket No. 96-128), on behalf of the RBOC/GTE/SNET Payphone Coalition, July 13, 1998.

Testimony before the Public Service Commission of Maryland evaluating the restructuring plan proposed by Baltimore Gas & Electric Company (Case No. 8794), on behalf of Baltimore Gas & Electric Company, July 1, 1998.

Statement before the Public Utility Commission of Texas regarding the Proposed Rulemaking on Code of Conduct for Electric Utilities and Their Affiliates, on behalf of Texas Utilities, June 19, 1998.

Affidavit Before the Federal Communications Commission in the matter of Application of SBC Communications Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region, InterLATA Services in Arkansas (with Timothy J. Tardiff), February 24, 1998; Rebuttal Affidavit, June 12, 1998.

Comments on the Pennsylvania Public Utility Commission Proposed Rulemaking Regarding the Establishment of Competitive Safeguards for the Pennsylvania Electric Industry, on behalf of the Pennsylvania Electric Association, June 9, 1998.

Testimony Before the State Corporation Commission of the State of Kansas in the matter of Southwestern Bell Telephone Company – Kansas' Compliance With Section 271 of the Federal Telecommunications Act of 1996, Docket No. 97-SWBT-411-GIT (with Timothy J. Tardiff), February 17, 1998; Rebuttal Testimony, May 27, 1998.

Rebuttal Affidavit Before the Public Utilities Commission of the State of California in support of Pacific Bell's Draft Application for Authority to Provide InterLATA Services in California (with Timothy J. Tardiff), May 20, 1998.

Rebuttal Testimony Before the Oklahoma Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, Cause No. PUD 970000560 (with Timothy J. Tardiff), April 21, 1998.

Testimony Before the State of New Jersey Board of Public Utilities, in the matter of Energy Master Plan Phase II Proceeding to Investigate the Future Structure of the Electric Power Industry, Docket Nos. EX94120585Y and EO97070463, regarding restructuring basic generation service, on behalf of Public Service Electric and Gas Company, April 16, 1998.

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc., Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Timothy J. Tardiff), March 2, 1998; Reply Affidavit April 17, 1998.

Affidavit Before the Federal Communications Commission in the matter of Application of SBC Communications Inc., Pacific Bell, and Pacific Bell Communications for Provision of In-Region InterLATA Services in California (with Timothy J. Tardiff), March 31, 1998.

Affidavit Before the Illinois Commerce Commission in the matter of Implementation of Section 16-121 of the Public Utilities Act, No. 98-0035, on behalf of Ameren Services, February 17, 1998; Rebuttal Affidavit, March 12, 1998.

Affidavit Before the Federal Communications Commission in the matter of Application of SBC Communications Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region, InterLATA Services in Oklahoma (with Timothy J. Tardiff), February 13, 1998.

Testimony Before the Massachusetts Department of Public Utilities on public policy considerations and principles re the Boston Edison Company/RCN joint venture (DPU 93-37), December 29, 1997.

Testimony Before the Massachusetts Department of Public Utilities on the Standards of Conduct for Distribution Companies and Their Affiliated Companies, on behalf of Boston Edison Company (DPU 97-96), November 21, 1997.

Statement Before the California Public Utilities Commission on Order Instituting Investigation to Establish Standards of Conduct Governing Relationships between Energy Utilities and Their Affiliates, on behalf of Edison Electric Institute (Docket No. I.97-04-012), November 17, 1997.

Rebuttal Testimony Before the Delaware Public Service Commission Concerning the Cost Accounting Manual and the Code of Conduct, on behalf of Delmarva Power & Light Company. Docket No. 97-65, October 20, 1997.

Verified Statement Before the Surface Transportation Board on the need for shipper protections created by the acquisition of Conrail by the Norfolk & Southern and CSX Railroads, on behalf of electric utility shippers of coal (with Frederick C. Dunbar). Finance Docket No. 33388, October 20, 1997.

Testimony Before the Public Utility Commission of the State of Texas evaluating AT&T's proposed rates for unbundled network elements, on behalf of Southwestern Bell Telephone Company. Docket Nos. 16189, et al, September 15, 1997.

Affidavit Before the Public Service Commission of the State of Missouri In the Matter of AT&T Communications of the Southwest, Inc.'s Petition for Arbitration pursuant to Section 252(b) of the Telecommunications Act of 1996 to Establish an Interconnection Agreement with Southwestern Bell Telephone Company, Case No. TO-97-40, on behalf of Southwestern Bell, August 20, 1997.

Rebuttal Testimony Before the Pennsylvania Public Utility Commission on the merits of stranded cost recovery, the estimation of stranded costs and competitive safeguards, on behalf of Pennsylvania Power & Light Company, Docket No. R-00973954, August 4, 1997.

Affidavit Before the Federal Communications Commission In the matter of Application of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provisions of In-Region, InterLATA Services in Oklahoma, CC Docket 97-121 (with Timothy J. Tardiff), on behalf of Southwestern Bell, February 13, 1997 (Filed April 7, 1997); Reply Affidavit, May 28, 1997.

Affidavit Before the Federal Communications Commission In the matter of Application of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region, InterLATA Services in Kansas, CC Docket 97-121 (with Timothy J. Tardiff), on behalf of Southwestern Bell, April, 1997.

Statement in Support of The Southern New England Telephone Company's Proposed Reorganization, on behalf of SNET, March 24, 1997.

Statement of Professor Alfred E. Kahn and Report of Professor Jerome E. Hass on Railroad Revenue Adequacy Standards, analyzing the methods by which the Surface Transportation Board determines whether individual railroads are or are not "revenue adequate," on behalf of the Alliance for Rail Competition, February 1997.

Statement of Alfred E. Kahn on FCC's Proposed Reforms of Carrier Access Charges (re proposed Order in CC Docket No. 96-488), on behalf of the United States Telephone Association, February 14, 1997.

Verified Statement Before the Surface Transportation Board on behalf of the National Industrial Transportation League and the Western Coal Traffic League commenting on the joint statement submitted by the Association of American Railroads, Docket No. 41626, Docket No. 41242, Docket No. 41295, November 27, 1996.

"Joint Marketing, Personnel Separation and Efficient Competition Under the Telecommunications Act of 1996" (with Timothy J. Tardiff), a statement on behalf of U S West commenting on the FCC's NPRM of July 17th, in CC Docket No. 96-149, October 11, 1996.

"Economic Competition in Local Exchange Markets" (with Kenneth Gordon and William E. Taylor), on behalf of Bell Atlantic Company, commenting on a statement by seven economists on the pricing of essential network elements submitted by AT&T in state arbitration proceedings, August 9, 1996.

Declaration Before the Federal Communications Commission In the Matter of Allocation of Costs Associated with Local Exchange Carrier Provision of Video Programming Services, CC Docket No. 96-112, July 19, 1996.

Testimony before the Kansas Corporation Commission commenting on the continuing regulation and deregulation of the telecommunications industry in Kansas with reference to Competition docket HB 2728, on behalf of Southwestern Bell, Docket No. 190,492-U, June 14, 1996.

Declaration before the Federal Communications Commission In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, on behalf of Bell Atlantic (with Timothy J. Tardiff), CC Docket No. 96-98, May 30, 1996.

Testimony before the Public Service Commission of Maryland In Support of the Petition of Bell Atlantic - Maryland, Inc. for Adoption of a Price Cap Form of Alternative Regulation, on behalf of Bell Atlantic - Maryland, February 15, 1996; Rebuttal March 14, 1996; Surrebuttal April 1, 1996.

Testimony before the Public Service Commission of Pennsylvania regarding the Formal Investigation to Examine and Establish Updated Universal Service Principles and Policies for Telecommunications Services, Docket No. I-940035, on behalf of Bell Atlantic - Pennsylvania, Inc., December 7, 1995; Rebuttal, February 14, 1996.

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Rebuttal Testimony before the State of Connecticut Department of Public Utility Control, discussing network unbundling, universal service and apportioning loop costs between telephone and video services, on behalf of the Southern New England Telephone Company, Docket No. 95-06-17, September 20, 1995.

Affidavit In the United States District Court for the Eastern District of Virginia (Alexandria Division) in the matter of United States Telephone Association, et al v. Federal Communications Commission, Civil Action No. 95-533-A, on behalf of USTA (with William E. Taylor), October 24, 1995.

"Preserving Universality of Subscription to Telephone Service in an Increasingly Competitive Industry" (with Timothy J. Tardiff), before the Public Utilities Commission of the State of California, on behalf of Pacific Bell, September 1, 1995.

Rebuttal Testimony before the Commonwealth of Massachusetts Department of Public Utilities, Docket 94-185, discussing network unbundling and universality of service, on behalf of NYNEX, August 23, 1995.

"Alternative Regulation for Connecticut Telecommunications Services," before the Connecticut Department of Public Utility Control, discussing the economic principles that should guide the introduction of an alternative form of regulation for noncompetitive telecommunications services, on behalf of the Southern New England Telephone Company, Docket No. 95-03-01, June 15, 1995.

Rebuttal Testimony before the New Jersey Board of Regulatory Commissioners, in the matter of the Investigation Regarding IntraLATA Toll Service Competition on a Presubscription Basis, Docket No. TX94090388, on behalf of Bell Atlantic - New Jersey, Inc., May 31, 1995.

Testimony before the Connecticut Department of Public Utility Control on strandable investments, on behalf of United Illuminating, Docket 94-12-13, March 24, 1995.

"Rebuttal Evidence on Rate-base Splitting, Price Caps and the Treatment of Economies of Scope in Telecommunications Regulation," submission to Canadian Radio/television and Telecommunications Commission, Ottawa, Ontario, Canada, on behalf of AGT Limited, March 30, 1995.

"Preconditions of Efficiently Competitive Local Exchange Markets," submission to Canadian Radio/television and Telecommunications Commission, Ottawa, Ontario, Canada, on behalf of AGT Limited, March 15, 1995.

Testimony before the Connecticut Department of Public Utility Control, Docket Nos. 94-10-01-02, on incremental cost standards for network unbundling, on behalf of the Southern New England Telephone Company, January 10, 1995; Rebuttal Testimony, February 13, 1995.

"Comments on Competition in Electric Power," submission to Rhode Island Division of Public Utilities and Carriers, inquiry into retail competition in the electric utility industry, on behalf of The Narragansett Electric Company, Docket D-94-9, November 18, 1994.

Testimony before the State of New York Public Service Commission in the Petition of Rochester Telephone Corporation for Approval of Proposed Restructuring Plan (Panel on Public Policy Issues with Robert W. Crandall), Case Nos. 93-C-0033 and 93-C-0103, February 3, 1993; Testimony of Panel on Public Policy Issues in Support of Settlement, June 17, 1994; Rebuttal Testimony of Panel on Public Policy Issues, July 22, 1994.

Affidavit before the Federal Communications Commission In the Matter of Price Cap Performance Review for Local Exchange Carriers, Notice of Proposed Rulemaking, on behalf of Bell Atlantic, filed June 29, 1994.

Affidavit before the U.S. District Court for the Northern District of Alabama Southern Division on behalf of BellSouth Corporation on overturning the statutory prohibition of telephone companies carrying their own video programming, filed June 3, 1994.

Reply Affidavit before the U.S. District Court for the District of Michigan (Eastern Division) on behalf of Ameritech Corporation on overturning the statutory prohibition of telephone companies carrying their own video programming, filed May 16, 1994.

Affidavit before the U.S. District Court for the District of Columbia on behalf of Southwestern Bell in support of request for out-of-region waiver from the interLATA MFJ restrictions (with William E. Taylor), filed May 12, 1994.

Reply Affidavit before the U.S. District Court for the District of Maine on behalf of NYNEX Corporation on overturning the statutory prohibition of telephone companies carrying their own video programming, filed May 6, 1994.

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Testimony on behalf of The Chesapeake and Potomac Telephone Company of Maryland, Case No. 8584, on the regulatory principles applicable to determining an efficient price for MFS-I's interconnection with C&P's network (with William E. Taylor), filed November 19, 1993; Rebuttal Testimony filed January 10, 1994; Surrebuttal Testimony filed January 24, 1994.

Affidavit to the Federal Communications Commission with respect to Interstate Long Distance Competition and AT&T's Motion for Reclassification as a Nondominant Carrier (with William E. Taylor), filed November 12, 1993.

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Affidavit before the U.S. District Court for the Eastern District of Virginia in the matter of *The Chesapeake and Potomac Telephone Company of Virginia v. United States of America*, Civil Action No. 92-1751-A, June 5, 1993 and before the Federal Communications Commission *In the Matter of Amendments of Parts 32, 36, 61, 64 and 69 of the Commission's Rules to Establish and Implement Regulatory Procedures for Video Dial Tone Service*, Petition for Rulemaking RM 8221, June 7, 1993.

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Testimony on behalf of New Zealand Telecom in an antitrust proceeding before the High Court of New Zealand involving terms of interconnection with Clear, a competitive provider of local transport, April 27, 1992.

Testimony on behalf of AMR Corporation and American Airlines, Inc., against UAL Corporation, United Airlines, Inc., UAL Acquisition, Inc., Air Wisconsin, Inc., and Air Wisconsin, Inc., 91 CIV. 7773 (KMW), analyzing United Airlines' acquisition of Air Wisconsin's 50 O'Hare jet slots, March 2, 1991. Supplemental and Second Supplemental Testimonies, March 10 and 15, 1992.

Testimony before the Illinois Commerce Commission on behalf of Illinois Power Company, Docket No. P91-0001, on certification of a competing natural gas pipeline, February 24, 1992.

Rebuttal Testimony before the Florida Public Service Commission, Tampa Electric Co. Docket No. 910883EI, on electric utility company responsibilities for demand side management, November 20, 1991.

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Oral testimony before the Puerto Rican Legislature on privatization and future regulation of the Puerto Rico Telephone Company, June 20, 1990.

Testimony on behalf of Central Telephone Company of Florida before the Public Service Commission, June 12, 1990.

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Reply Verified Statement on behalf of Concerned Shippers, In the Matter of Railroad Cost Recovery Procedures—Productivity Adjustment; Ex Parte No. 290 (Sub-No. 4), January 17, 1989.

Testimony on behalf of California Coalition for Trucking Deregulation before the Public Utilities Commission of the State of California, In the Matter of the Regulation of General Freight Transportation by Truck, Case No. I-88-08-046, October 27, 1988.

Testimony before the Public Service Commission of the State of New York on the application to construct the Empire State gas pipeline, Case No. 88-T-132, October 1988.

Testimony before the Federal Communications Commission on behalf of Bell South on adjustment factor for local exchange companies under rate cap regulation, In the Matter of Policy and Rules Concerning Rates for Dominant Carriers (CC Docket 87-313), July 1988.

Affidavit on behalf of Massachusetts Port Authority in a proceeding on the proposed structure of landing fees for Logan Airport, Boston, U.S. District Court, District of Massachusetts, June 1988.

Affidavit on behalf of Financial Interchange Inc. in an antitrust arbitration proceeding on the legality of jointly set interchange fees of an electronic funds transfer network, April 1988.

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Testimony on behalf of Kentucky Industrial Utility Customers Case No. 9934 on the criteria for deciding whether a nuclear plant should be completed, February 8, 1988.

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Service Commission, September 8, 1983; and Texas Public Service Commission, September 19, 1983, for Southwestern Bell Company.

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Testimony before Motor Carrier Ratemaking Study Commission, Orlando, Florida, April 2, 1982.

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(Rev. 5/99)

CRANDALL DECLARATION

**Before the
Federal Communications Commission
Washington, DC 20554**

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MAY 26 1999

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

In the Matter of

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Implementation of the Local Competition
Provisions in the Telecommunications Act
of 1996

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CC Docket No. 96-98

Declaration of Robert W. Crandall

Qualifications

1. I am a Senior Fellow in Economic Studies at the Brookings Institution in Washington, DC, a position that I have held since 1978.¹ Prior to that I was Acting Director, Deputy Director, and Assistant Director of the Council on Wage and Price Stability in the Executive Office of the President, and in 1974-75 I was an adviser to Commissioner Glen Robinson of the Federal Communications Commission. I was an Assistant Professor and Associate Professor of Economics at MIT between 1966 and 1974. I have written widely on telecommunications policy, the economics of broadcasting, and the economics of cable television. I am author or co-author of four books on communications policy published by the Brookings Institution since 1989: Changing the Rules: Technological Change, International Competition, and Regulation in Communications (with Kenneth Flamm), 1989; After the Breakup: U.S. Telecommunications in a more Competitive Era, 1991; Talk is Cheap: The Promise of Regulatory Reform in North

¹The views expressed herein are solely my own and should not be taken to represent the views of the Brookings Institution, its other staff members, or its Trustees.

American Telecommunications (with Leonard Waverman), 1996; and Cable TV: Regulation or Competition? (with Harold Furchtgott-Roth), 1996. A new book on universal-service policy, co-authored with Leonard Waverman, will be published by Brookings at the end of this year. A copy of my curriculum vitae is attached.

2. I have been asked by Bell Atlantic to provide an analysis of the extent to which competitors should have access to the incumbent carriers' network elements. In so doing, I draw upon general economic principles as well as recent developments in technology and market entry in local wireline and wireless services. In addition, I refer briefly to the favorable experiences of market liberalization and deregulation in other industries -- industries in which entry was not guided by extensive cost-based wholesale regulation of access to incumbents' facilities.

Summary of Conclusions

3. The Commission should be particularly concerned that its unbundling rules not discourage investment in new network facilities because facilities-based competition is likely to be the most intense and long-lasting form of competition. Unbundling of individual network elements or combinations of those elements should only be required if the Commission has evidence that entrants cannot build their own facilities or cannot obtain them from other sources.

4. The pace of technological change in electronics and communications is incredibly rapid. It is important, therefore, that the Commission's unbundling rules take a balanced

approach that encourages new entrants and incumbents to adopt these new technologies through investments in new innovative networks that allow them to develop new product offerings. Extensive unbundling of existing circuit-switched networks is likely to dissuade entrants from adopting these new technologies and to discourage incumbent local-exchange companies (ILECs) from engaging in similar innovation in their own networks.

5. The Commission has now had three years since the passage of the Telecommunications Act to observe entry decisions by scores of competitive local exchange carriers (CLECs) who are building their own facilities. The Commission should also examine the rapid development of competition in wireless markets in which billions of dollars are being invested in new capital facilities by entrants with little reliance on incumbents' facilities. These companies' investment decisions clearly reveal the degree to which they can build their own facilities, thereby rendering many or all of the ILECs' facilities unnecessary for successful entry. As such entry proceeds, it becomes impossible to conclude that lack of access to ILEC facilities at regulated TELRIC rates will impair the development of competition.

6. The availability of non-ILEC elements is increasing over time, particularly in areas of substantial population density. Therefore, unbundling requirements should be reduced over time as new sources of network functionality appear and should be substantially less extensive in the more dense, urban areas.

Introduction

7. We are now nearly 40 months past the enactment of the 1996 Act which opened local markets to competition. When the Commission first developed its rules requiring ILEC unbundling, it had only limited evidence on the ability of the CLECs -- the pre-1996 Competitive Access Providers (CAPs) -- to build their own facilities. Nor could the Commission predict how technology would develop in local wireline and wireless markets as these markets were opened to entry. Since the Commission first promulgated its original interconnection rules in August 1996, however, the U.S. telecommunications sector has changed considerably. CLECs, such as Nextlink, ICG, Winstar, Teligent, and e.spire, have invested billions of dollars in their own facilities. Wireless companies have likewise invested billions of dollars in building out PCS and other systems. MCI-WorldCom is the result of numerous large mergers, including WorldCom's acquisition of MFS, Brooks Fiber, and MCI. AT&T -- the largest interexchange carrier -- has experimented with resale and fixed wireless as vehicles for entering the local telecom market, and has purchased Teleport -- one of the largest and oldest CLECs -- and IBM's backbone network. In addition, AT&T has paid \$40 billion to acquire the nation's largest cable television company, TCI, and has offered to acquire Media One for \$54 billion. Moreover, AT&T is now poised to spend billions of dollars to upgrade these acquired cable television facilities in order to provide its subscribers with two-way telecommunications services, including high-speed Internet access, through a network that is closed to other service providers.

8. Internet usage has grown so rapidly that data traffic is now greater than voice traffic in

the nation's telecommunications network. As a result, carriers are rushing to develop low-cost, high-speed Internet connections to bundle with other communications services. Cable television companies (including AT&T's new cable operations) CLECS, ILECs, and satellite companies are developing alternative high-speed connections to offer dispersed subscribers as separate, independent services or as part of a bundle of communications services.

The Role of Unbundled Elements in Promoting Local Market Entry

9. The 1996 Act requires ILECs to unbundle their network facilities so as to accelerate the pace of entry into local telecommunications markets. But such unbundling is limited to those elements that are “necessary”, or without which likely entrants would be “impaired” in their efforts to begin to offer local service.² From an economic standpoint, these requirements are satisfied only when there are no good substitutes for the incumbents’ facilities -- either in the form of other firms’ facilities or through the entrant’s own investment in facilities that are constructed to provide local access/exchange service. If other CLECs are building networks with comparable functionality or if the entrant could build facilities that are similar to the ILEC facilities, competition could not possibly be impaired by a prospective entrant’s inability to use an ILEC’s particular functionality in the form of an unbundled network element (UNE).

10. It may be possible that in some situations an entrant’s duplication of certain ILEC facilities is uneconomic because such duplication could lead to the suboptimal use of parallel

² Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996 Act).

facilities.³ Access to these “essential” facilities -- long part of the antitrust case law -- then becomes necessary for efficient resource use and perhaps for viable entry. However, a facility that was “essential” for yesterday’s telephone service may not be today’s or tomorrow’s ideal facility for delivering tomorrow’s telecommunications services, given changing technology and the evolution of new services. If new entrants are discouraged by excessive regulatory intervention from developing their own facilities, regulators cannot be sure that any given facility is truly necessary or essential. Given the rapid pace of technological change in telecommunications, the definition of a “necessary” or “essential” element for new entrants will therefore change over time. As a result, unbundling rules should be defined for only a fixed period of time. Once new technologies or other facilities become available to provide a given function, unbundling of that network functionality should no longer be required.

The Dangers of Excessive Reliance Upon UNEs

11. To my knowledge, there have been very few examples from other industries in which existing firms were required to share their facilities with aspiring entrants. Decrees in antitrust cases occasionally require a divestiture of assets to competitors, but rarely a sharing of them. The essential facilities doctrine may require a company to allow its rivals to use a bridge or a right of way, but not large parts of its entire operations. Nor has there been any substantial experience

³ This doctrine developed out of cases involving “bottlenecks” such as railroad bridges that would be difficult for competitors to replicate. See U.S. v. Terminal Railroad Association, 224 U.S. 383.

with such sharing of network components in the telecom sectors in other countries.⁴ Thus, the Commission is in uncharted waters in attempting to promote competition through widespread unbundling. In doing so, it must take into account the effects of unbundling on investment and innovation in the telecommunications sector by both entrants and incumbents.

12. First, allowing firms to lease unbundled elements at regulated prices based on forward-looking costs creates a substantial disincentive for entrants to place their capital at risk by building their own facilities. Why would an entrant invest millions or even billions of dollars in sunk costs if it could simply lease them from incumbents at TELRIC rates? It would do so only if it desired a different network design or technology, but in such a case the entrant would not be impaired by being unable to obtain access to unbundled ILEC facilities.

13. Second, as long as the incumbent knows that it must lease its facilities at forward-looking economic cost, its incentive to invest in network upgrades or expansions is severely attenuated. Indeed, AT&T's Chairman, Michael Armstrong, has vigorously argued that forcing AT&T to unbundle would reduce its incentive to invest in upgrading its cable systems:

If these companies [ISPs] want to get into broadband, terrific. But getting a free ride on someone else's investment and risk is not the way to do it.

⁴ Other countries, such as members of the European Union, are beginning to implement unbundling requirements. Thus far, however, the United Kingdom, the first European country to liberalize its telecommunications sector, has not required its incumbent (British Telecom) to unbundle its network. Nevertheless, the UK entrants (primarily cable companies) have been able to build their own facilities and enroll more than 20 percent of homes as telephone subscribers.

It's not fair. It's not right. Worse it would inhibit industry growth and competition. No company will invest billions of dollars to become a facilities-based broadband services provider if competitors who have not invested a penny of capital or taken an ounce of risk can come along and get a free ride on the investments and risks of others.

That would be a major disincentive to the kind of risk-taking that goes with infrastructure investments. And discouraging investment would have a chilling effect on competition. Not just competition in advanced services, but local phone competition as well.⁵

The Commission recognized these disincentive effects from cost-based retail rate regulation in 1989-90 when it substituted price caps for cost-based regulation of AT&T and local exchange carriers.⁶ It should acknowledge now that any unbundling regime in which rivals may lease network elements, or combinations of network elements including the entire UNE platform, at regulated, cost-based prices produces similar disincentive effects and limit the scope of unbundling accordingly.

14. Finally, far too little attention has been paid to the adverse incentives created by ILEC lessors and CLEC lessees sharing the same network to deliver telecom services. Both the networks and the services offered by incumbents and entrants are subject to substantial change over time. Any decision by an ILEC to modify its network to provide new or better services or to deliver them more efficiently is likely to have an impact on the CLECs leasing pieces of its

⁵ C. Michael Armstrong, Chairman and CEO, AT&T, "Telecom and Cable TV: Shared Prospects for the Communications Future," Address delivered to the Washington Metropolitan Cable Club, Washington, DC, November 2, 1998.

⁶ Policy and Rules Concerning Rates for Dominant Carriers, Report and Order and Second Further Notice of Proposed Rulemaking, 4 FCC Rec. 2873 (1989).

network. These CLECs will surely have every incentive to complain to regulators that network changes are designed to disadvantage them (the CLECs) and thereby to block or delay their rivals' attempts to develop more attractive services. If every innovation in network design must first be scrutinized by rival CLECs who are lessees of network elements, surely the pace of innovation will slow substantially. For instance, ILECs might be forced to delay the substitution of fiber for copper or the substitution of packet switching for circuit switching technologies by CLEC complaints that they are disadvantaged by such technical progress. Regulators in rivalrous markets are always at risk of being used by market participants to frustrate competition. Widespread unbundling -- i.e., network sharing -- simply multiplies these opportunities many times over. The more extensive are the unbundling requirements, the greater are the opportunities for conflict and opportunistic use of the regulatory process.

All Networks Are Not the Same

15. Entry into the local telecommunications market can occur with a variety of network designs. Much of the functionality of the current ILECs' networks can be delivered by different facilities. For instance, coaxial cable, fixed wireless, mobile wireless, MMDS, or satellite circuits may each be used as substitutes for the copper loop. Packet switches, Class 4 (IXC) switches, or wireless switches may be used to switch local traffic. Inter-office transport can be provided by a variety of wireless services or fiber-optic lines. As entrants build their networks, they are finding that they are not impaired in delivering services without the use of ILEC network elements.